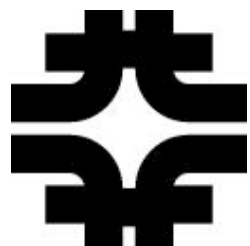# *WLCG/GDB networking*

D. Petravick

ESCC Meeting

July 20, 2006

LHC-Relevant Organizations.

- WLCG -- World Wide LHC Computing Grid.
  - LCG -- "Europe"
  - Open Science Grid -- "US"
  - NorduGrid -- "Scandanavia"
- GDB -- Grid Deployment Board
  - http://lcg.web.cern.ch/LCG/Boards/GDB/gdb.html
  - "Members of the GDB are representatives from each country that participates in LHC computing, representatives of the experiments and CERN and officers of the [*W-dlp*]LCG project."
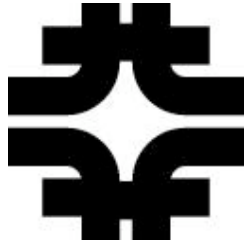
Network Sub Group

- "The Optical Private Network OPN group is concerned with all networking for the LHC data distribution and analysis but currently concentrates on the Tier-0 to Tier-1 network. The chairperson of this group is David Foster from CERN."

- Task 1 -- Define, and cause to be provisioned the "LHC OPN".
  - Accepted Mission: CERN -> T1 data transfers.
  - Considered mission T1 <-> T1 transfers.
  - A place to "talk to" relevant networks -- Esnet, GEANT, USLHCNET, European NRENS.

- Whole mission T[012] networking.
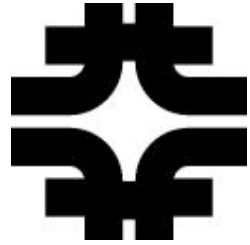
CERN -> T1 networks

- For the US this is
  - CMS: Ingest from CERN to FNAL
  - ATLAS Ingest from CERN to BNL
  - N.b.European T1 centers are multi experiment.
- Attributes:
  - Calculable DC rates.
  - 24x7 for proton running.
   - Penalty -- have to haul the data off tape.
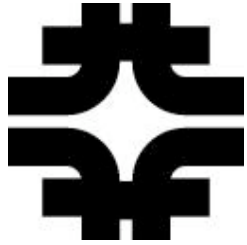
Defined:

- "LHC OPN"
  - Overlay network
- 10 Gbit provisioning to each T1 site.
- Security model sufficient to mitigate need for firewalls (ACLs will suffice)
- Operational model for Overlay
  - Build common view by building on perf sonar.
  - Coordinate and liaison for trouble shooting.
- Monitoring Framework
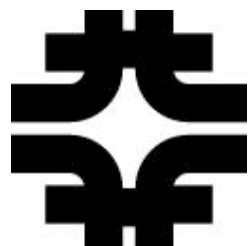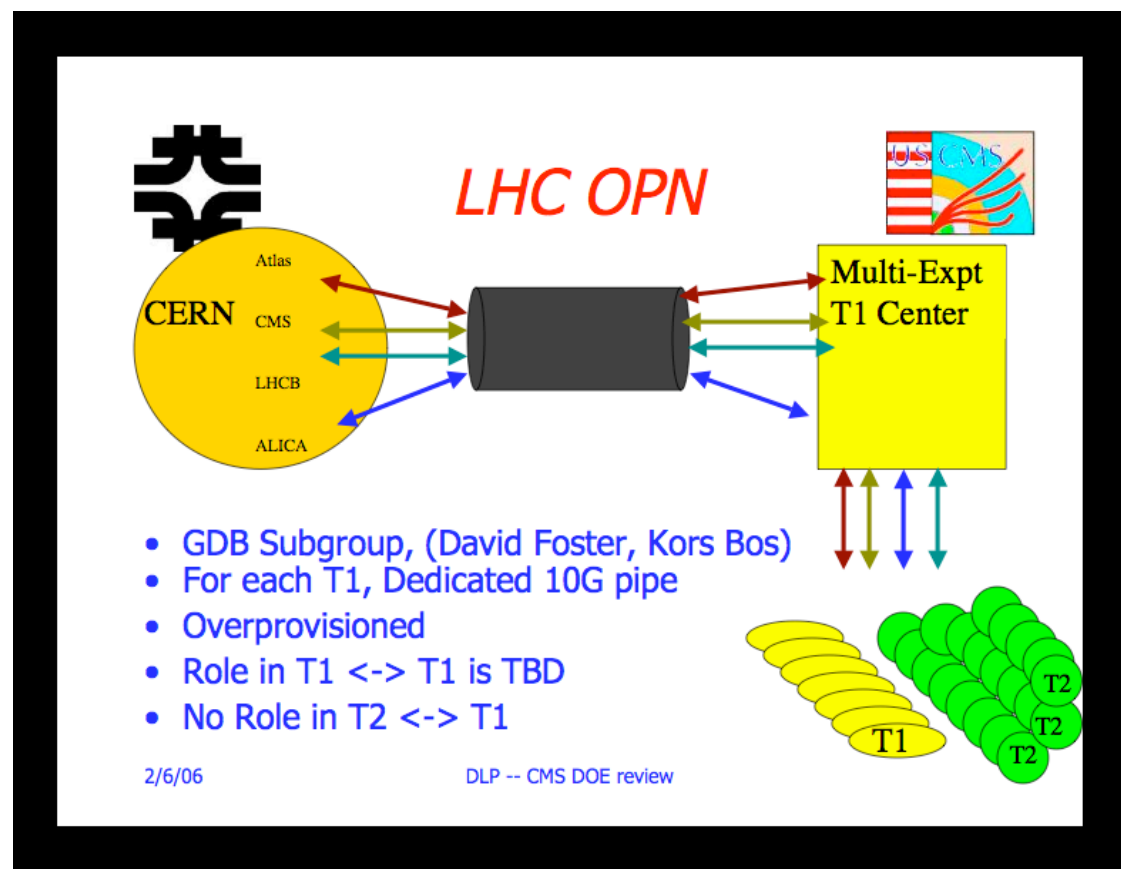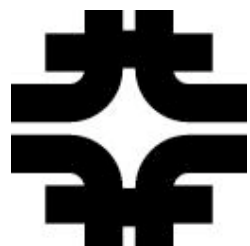 - Machines at many sites. (S. McKee).
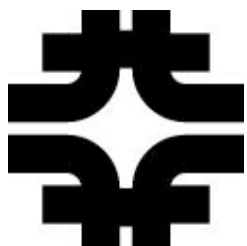
OPN overview
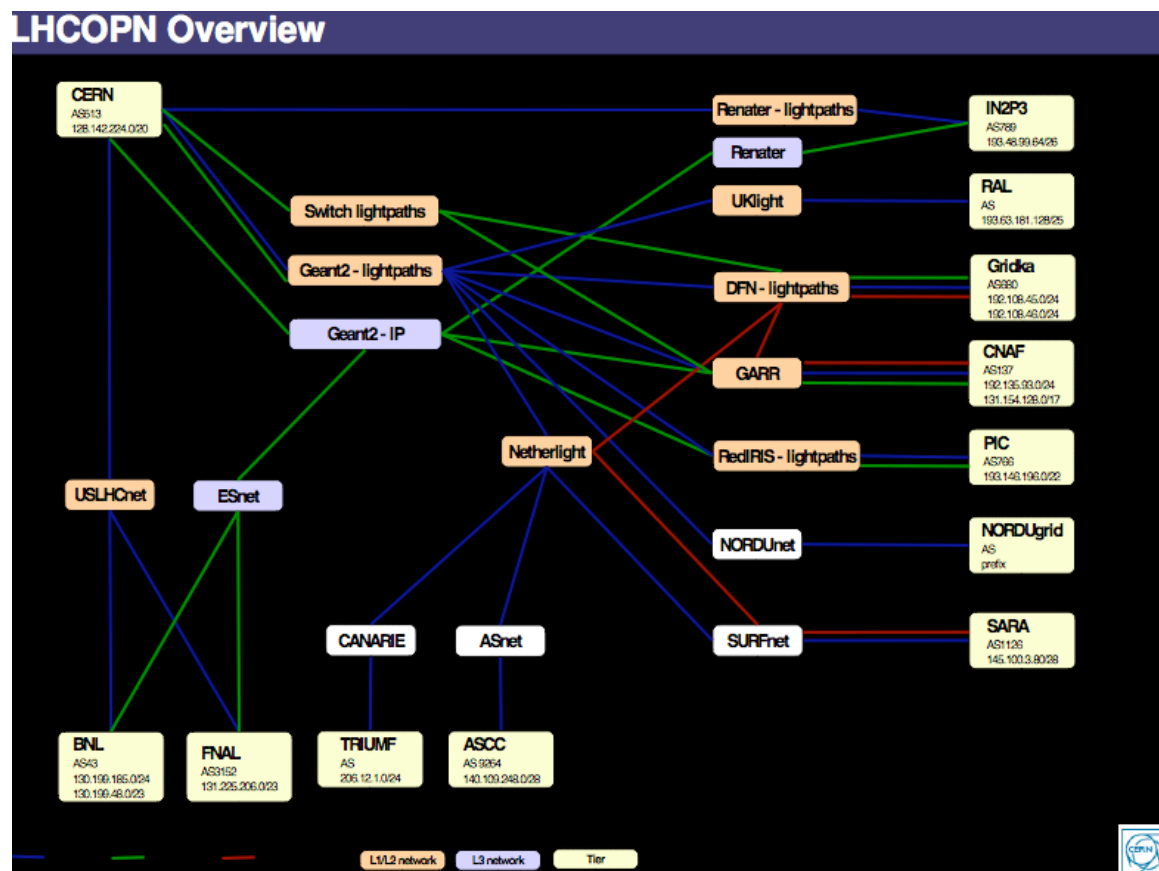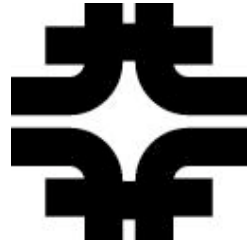
Comments

- European T1's
  - Multi experiment
  - Over-provisioned for ingest, contention within 10 gig posited to be insignificant.
  - Attempts to work closely with GEANT and European NRENS.
 - 10 gig links CERN -> European T1's are increasingly available

Feb 2006 ideal

LHC OPN

CERN — Atlas, CMS, LHCB, ALICA

Multi-Expt T1 Center

- GDB Subgroup, (David Foster, Kors Bos)
- For each T1, Dedicated 10G pipe
- Overprovisioned
- Role in T1 <-> T1 is TBD
- No Role in T2 <-> T1

2/6/06   DLP -- CMS DOE review

T1

T2
T2
T2
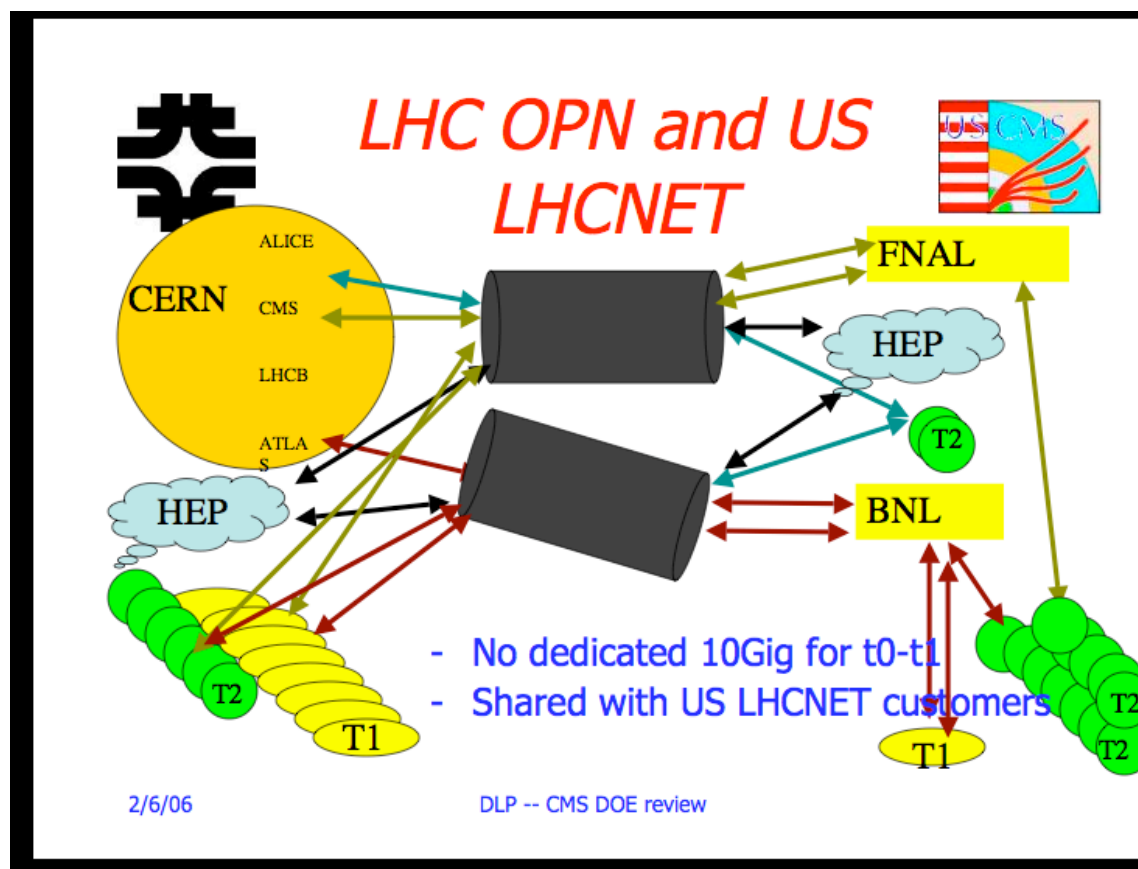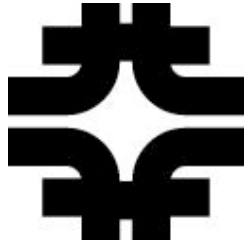
Comments (US)

- US LHCNET is funded to supply production transatlantic networking.

- Trans-Atlantic links are more expensive than links within Europe.

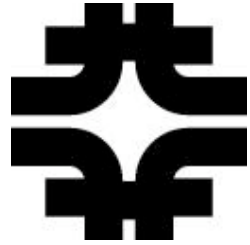- Not currently provisioned for 10 Gig dedicated.
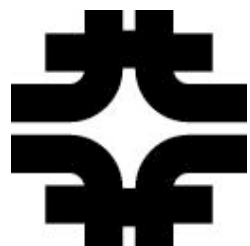
Feb 2006 actual

T1 <-> T1

- The GDB committee has fostered much CERN-centric network provisioning.
- Current use of the provisioning is not limited to t0->t1 traffic.
- The committee will decide it role on T1 <-> T1 traffic at its September meeting in Utrecht.

US impact

- For the US T0 <-> T1, T1<->T1 imply provisioning by:
  - US LHCNET (to MANLAN and Starlight)
  - ESNET (the respective metropolitan MANs)
  - Intra-Lab networking.
- Principal differences w.r.t Europe
  - Cost in provisioning
 - Less numerous representation

T2's

- US ATLAS and US CMS have experiment-dedicated equipment for their Tier-2 centers.
  - This is not necessary the pattern for other regions.
- Since the committee's meeting is well attended by a broad community, the committee will consider a role w.r.t T2 centers.
  - Overseeing provisioning is not seen as possible.
  - Assessing provisioning , liaison, and a role in complex trouble shooting may be possible.
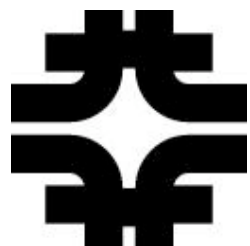 - CMS is "most ambitious, will be presented as a use case
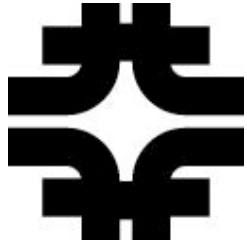
Technicnal Results @FNAL(outbound)

- **Outbound bytes**
  - Scale:
    - 2.5 Gbps (upper)
    - 3.0 Gbps (lower)
- **Inbound bytes**
  - ~1 Gbps

CMS Commissioning
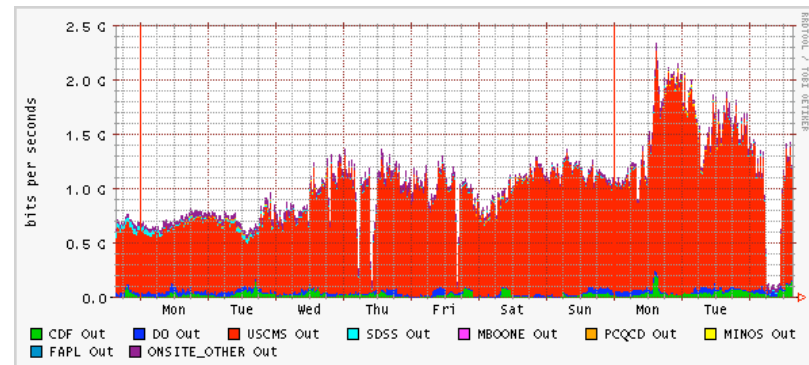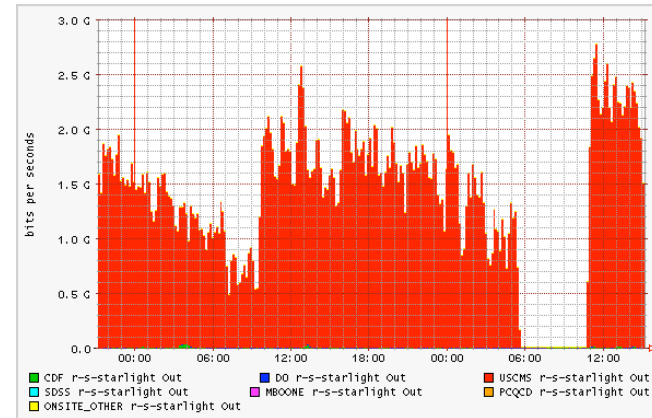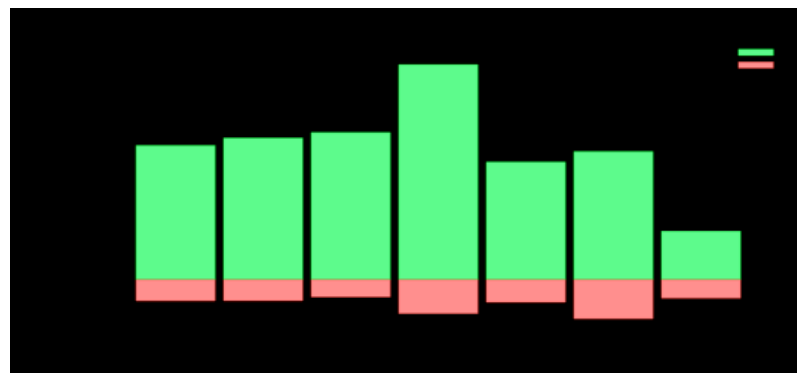
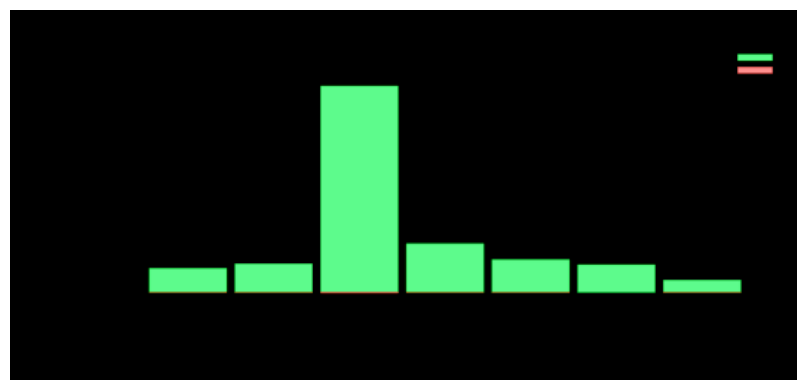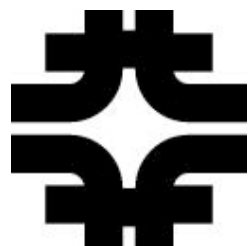# *Results (storage sys view)*

- CMS reads/day
  - Full scale 3E-14 bytes
    - 300 TB/day
    - > Peta bit/day scale
  - Most driven by programs reading locally.
- CMS ingest/day
  - Full scale 10 TB/day

CMS T2's

- CMS -- Analysis datasets are distributed among the T1's world-wide.
- A T2 center acquires a copy of the data set of interest from its host T1.
- US T2's need to communicate with all T1's
- The FNAL T1 center need to communicate with all T2's world-wide.
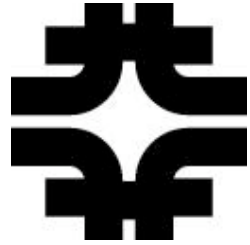
Atlas T2

- Are organized along a regional basis.
- The US T2's will communicate more with the the US T1.
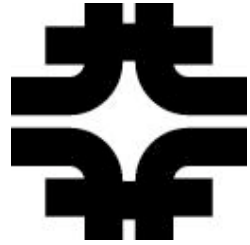
Low level kernel work

- Wenji Wu, Matt Crawford, "Potential Performance Bottleneck in Linux TCP", accepted, International Journal of Communication Systems, Wiley Press, July 2006

- Enhanced Linux Kernel 2.6.9, Release 1 delivered.